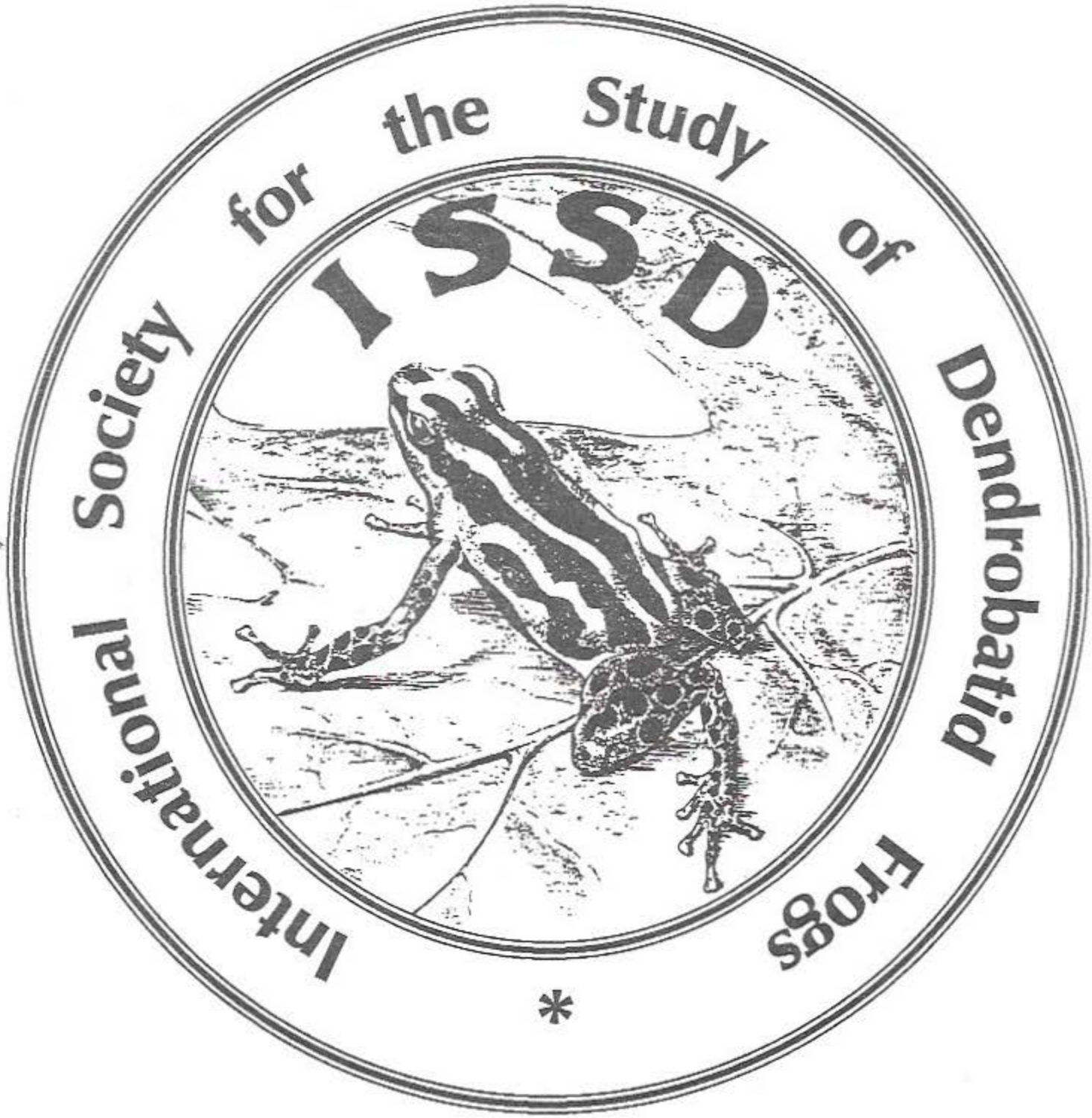


ISSD NEWSLETTER

Volume III Number 2 June 1990

International Society for the Study of Dendrobatid Frogs

I S S D

A general statement of some of the goals and objectives of ISSD:

ISSD exists to:

: To encourage, stimulate, and wherever possible, facilitate scientific research as it relates to any and all aspects of the study of Dendrobatid frogs; including, but not limited to, ecological studies, toxicological studies, taxonomic studies, and studies concerned with husbandry and captive propagation.

: To unify those individuals who participate in these studies and to provide vehicles of communication for the dissemination of knowledge gained as a result of this research.

: To afford those individuals who participate in programs of captive propagation the opportunity to develop a breeders network to facilitate breeding loans and species trades.

: To assist those individuals who need, or desire, to communicate with foreign government agencies which control access to wild populations of Dendrobatids in countries where they exist naturally.

: To encourage uniformity in record keeping systems for captive propagation programs, as well as uniformity in methods of wild captured specimen disposition reporting.

: To encourage preservation of, and protection for, populations of threatened or endangered Dendrobatid species; while at the same time preserving opportunities for limited access to those populations by individuals with legitimate research interests.

: To encourage the establishment and maintenance of stable and genetically diverse captive populations of endangered or threatened species.

Notes from the editors

We again ask for articles, pictures, anything of interest to our joint hobby of keeping Dart-poison Frogs. It should also be noted that the **ISSD** Newsletter will now be a quartly issue, March, June, September, and December. We have been very late with the first issue (just learing how to put this newsletter together and printed took more time than we expected, not to mention that we got a late start), and the second issue is just a little late, but from now on we expect to meet this schedule. The only thing that could keep us from this schedule is a lack of articles and pictures so please contribute and help to make the **ISSD** Newsletter something we'll all be proud of. Thanks.

Stewardship and Obligation

The word "steward" has many different meanings - one who manages anothers affairs or a person who attends to manageing a household; in otherwords someone who manages something for another. The phrase "stewardship of the land" refers to someone taking care of the land so it will be around for future generations, this is rarely practiced. Stewardship of the land was practiced by 'ancient' North America Indians and their meaning of stewardship was to leave the earth as they found it. Unfortunately in modern times this is becomming an impossibility. The world is shrinking - we are all aware of the mass deforesting programs, exotic woods being sold for fine furiture, yacht decking and railings. Third World governments trying to solve proverty problems by granting foresting and farming rights in virgin rain forests. This is not a new practice - the U.S. deforested over 90% of its virgin forest by 1890. And who recieves the biproducts of this deforestation -

can the third world be blamed as we keep comsuming?

This all leads to several questions - Should we be collecting? Should we strive to conserve our deminishing resources? Do we place the jewels of our world in a bottle? The answer probably will stir up a debate, but inevitably the answer should be yes. When we hold these creatures in our hands is it then ownershp or stewardship. It is foolish to believe that when one posses a living creature it is ownership. It is stewardship. If, our obligation for the vanishing species we hold in our hands does not stop at prepraring a subitable environment. The obligation must continue to the point of reproduction , because it is just not good enought to have these jewels for a short time and then loose them. If we believe that this world will survive we must be willing to pass them on to future generations. Replanting the earth will one day become necessary and hopefully we will be able to replace some of the myrid of life that has fallen in the wild to our thoughtlessness. Each of us has an obligation to bring a seed to replant the "Garden of Eden" that was once the earth.

-Want Adds-

Charlie Fanzlaw (28550 Avenida Gaviota, Quail Valley, CA 92380 Tel.: (714) 244-4947). For Sale in August: *Dendrobates auratus* (0:0:?) from wild Hawaiian stock. Member $25 ea., Non-members $35 ea. Minimum 3 specimens. Because I believe in breeding these beautiful frogs if 6 or more are purchased I will reduce the price by $5 ea. I'm also interested in finding the following species: *Dendrobates fastasticus, D. reticulatus, D. lehmanni* (red and/or color phase). Also the title of any books published specifically on dart-poison frogs.

Terry Chatterton (8007 Ridge Rd., Arvada, CO. 80002. Tel.: (303) 420-7647). I'm interested in finding a pair of *Phyllobates terribilis*.

Hidden life: The new amphibian and reptile exhibits at the National Aquarium in Baltimore[1]

by Anthony P. Wisnieski and John F. Cover, Jr.

[1] printed with permission of the American Association of Zoological Parks and Aquariums AAZPA, 1989 Annual Conference Proceedings, Pittsburg, PN, 24-28 September, pp. 547-554.

Introduction

One of the most interesting aspects of the National Aquarium in Baltimore (NAIB) is the walk-through neotropical rain forest located in a glass pyramid on its roof. The primary educational message of this exhibit is one of conservation - showing visitors what will be lost if rain forests are destroyed.

In the hallway exiting the main exhibit, visitors encounter further examples of the diverse and often hidden forms of life found in this fragile ecosystem. Here, rain forest micro-habitats containing a variety of amphibian and reptile species are recreated in the new "Hidden Life" exhibits.

Project History

In 1985, the National Aquarium in Baltimore entered the planning stages for a series of amphibian and reptile exhibits that would replace the seven 110 liter terraria in the existing "Gem Hallway." Designs for the new exhibit tanks and plans for extensive renovations and additions to the backup facilities were submitted by the senior author to the Exhibits Committee and approved. Funding for the project was secured in the Fall of 1986 and construction began on the first phase - a new amphibian and reptile quarantine room. Upon

its completion in January, 1987, part of the existing collection was transferred there and the remainder temporarily moved into one of the bird holding areas. Demolition of the Gem Hallway began at this time and construction continued into early September. Later that month, Hidden Life officially opened to the public. It has proven to be one of the most popular and highly publicized exhibits at the NAIB.

Design Criteria

The following criteria were used to define our parameters and goals for the new exhibits:

1. The nine fiberglass exhibit tanks would be fabricated by the Larson Company, Tucson, AR (Reiss, 1987).
2. Photographs of natural exhibits (stream banks, root systems, etc.) taken during a staff expedition to Costa Rica (Jackson, *et al.*, 1987) would serve as models for tank decor.
3. The naturalistic decor would completely cover all inside walls of the exhibits.
4. Stepped vertical ledges would be incorporated into the decor to maximize space utilization by the animals and viewing opportunities for the public.
5. Planter pockets with drains were to be incorporated into each exhibit.
6. Based on a similar concept used by the Knoxville Zoo (Arnett, 1976), the exhibits would be mobile and interchangeable (two would be kept in reserve for rotation purposes, and to allow ample time for animal/plant acclimation).
7. Each exhibit would be provided with both front and top access.
8. Each exhibit would have its own filtration system.

Tank Specifications

Each exhibit tank has the following outside dimensions: 86.5 cm wide x 132 cm high x 91 cm deep. Primary access is through a brown-anodized aluminum framed window measuring 82 cm wide x 100 cm

high, located 76 cm above the floor. This is secured to the left front side of the tank by a stainless steel piano hinge. On the right side, two locks are countersunk into the frame. This window is centered so that 20 cm of the tank remain above and below it and 4 cm remain on either side. This allows room at the bottom of the tank for a pool and also keeps the screen top above the line of sight of the average adult.

Secondary access into the exhibits is through a 2 mm mesh stainless steel screened top which is framed in 1.5 x 4 cm thick fiberglass for rigidity. The lid is secured by sliding it into a slot on the top front of the exhibits while lowering its rear (into which two holes have been drilled) over two bolts which protrude from the back of the exhibit. Wing nuts are then used to lock the lid in place.

The tanks rest on stands constructed of fiberglass reinforced plastic angle 7 mm thick. This is glued at all unions and riveted for additional strength. A shelf made of white plastic "egg crate" (used for light diffusion in fluorescent ceiling fixtures) rests in the bottom of the stand. This provides a sturdy support for filters while allowing water, sand and small gravel to pass through. In each corner of the stand there is a rubber wheel, 6.5 cm in diameter, on a threaded shaft. These allow for the fine adjustments needed when mating the tanks viewing window to the walls viewing hole. Foam tape is placed around the inside perimeter of this hole to prevent light leaks.

The entire unit is secured to the wall by two pieces of all-thread, bent into hooks at one end. The hooks are slipped into eye-bolts anchored in the wall, and the straight ends pass through holes in the upper rear of the stand and are locked with wing nuts.

Filtration

Approximately 50% of the tank's floor is extended 2.5 cm below the remaining floor. This

constitutes the pool area and is covered with a filter plate. There are three threaded 2.5 cm drain holes in this section, one in the center of the pool below the plate and one in each front corner with clear PVC pipe extending above the plate. These latter two are used for water return for the filter, and/or overflow. Water levels can be varied by adjusting the height of the overflow pipe. The filter plate consists of the same plastic egg crate as the stand bottom. It is covered with fiberglass window screening to permit the use of fine grades of gravel, and also to prevent small tadpoles from swimming underneath. The overflow and water return pipes are also covered with this screening to prevent escapes. Silicon is then applied to secure everything in place.

Magnum 330 canister filters (Aquaria, Inc.) are used exclusively for filtration. The intake hose is connected to the center drain and the return hose to either of the corners. Alternatively, the return holes can be drilled into any part of the tank for waterfall effects. The drain holes in the planter pockets can be plugged to create pools at various elevations. There are brass quick release fittings and on/off valves at all tank-hose connections. The latter can also serve to regulate water flow rates.

Filter maintenance consists of rinsing the filter sleeve, carbon replacement and biannual oiling of the motor. When necessary, Roccal-D (Winthrop) is used as a disinfectant. Iodine compounds should not be used in systems housing amphibians (Stoskopf, *et al.*, 1985).

Exhibit pool maintained consists of draining and rinsing the gravel bed as needed. Water parameters (Odum, 1985) are monitored in-house in the systems laboratory.

All water used in the amphibian and reptile area is channeled into a temperature

control valve and then passed through a bank of four Life-Guard AF-93T, 29" chemical filters (Rainbow Plastics, Inc.) containing activated carbon to remove chlorine. This system has proven to be both inexpensive and dependable (Boyer, 1988).

Lighting

Lighting is provided by five florescent 40 watt Vita-lites (Duro-TEst Co.) and one fluorescent 40 watt black light (G.E.) placed directly over the exhibits (Gehrmann, 1987). Vita-lites are also used in the ceiling fixtures of the adjacent backup room. Incandescent spot lights (30-150W) are suspended over some exhibits to provide temperature gradients, as well as supplemental lighting for plants. The positioning of these is also used as a means for luring species that enjoy basking into public view.

Timers are used to control all lights in the amphibian and reptile areas. There are three independent systems that go on and off sequentially. For simulating dawn the "on" sequence is ceiling lights, followed by the black light/Vita-lite tank fixtures, then the remaining Vita-lite tank fixtures and, if applicable, the incandescent's. Each stage is separated by a thirty minute interval. The progression is reversed for dusk simulation. The photoperiod is a 12L/12D cycle.

A fourth system, not controlled by timers, is available for filters, infra-red heat lamps, etc.

Temperature/Humidity

Temperature is controlled by a computerized forced air system utilizing overhead ducts. The twenty-four hour temperature range in the Hidden Life backup room is 21-27°F.

Humidity is provided by an industrial size DeFensor humidifier (Nortec Industries, Inc.) which is usually set to 80%Rh. This is routinely turned

off during midday to simulate natural cycles. The humidity in the exhibits can be manipulated further by varying the duration of the morning misting and/or covering some or all of the top with thin clear plastic. Overhead misting nozzles controlled by programmable water timers were planned, but have yet to be installed.

Animal/Plant Selections

Since its inception in 1983, the herpetological program at the NAIB has focused its attention on dendrobatid frogs (Bainbridge, 1989). The exhibits therefore were designed with these animals in mind. Also, in keeping with the theme of our rain forest exhibit, only species occurring in the neotropics were considered. Groups were give preference over single specimens and no exhibit was to contain less than two species. Given these criteria, the follow selections were made. Tank 1: 0.0.1 Tan-striped Poison-dart Frogs, *Colostethus talamancae*; 4.8.3 Strawberry Poison-dart Frogs, *Dendrobates pumilio*; 1.1.6 Yellow-lined Poison-dart Frog, *Phyllobates lugubris*; 0.0.3 Casque-headed Treefrog, *Triprion petasatus*; 1.0.0 Red-headed Anole, *Anolis marmoratus*; and 1.0.0 Zebra Anole, *Anolis roquet zebrilus*. Tank 2: 1.0.0 Green Basilisk Lizard, *Basiliscus plumifrons*; and 0.1.0 Argentine Horned Frog, *Ceratophrys ornata*. Tank 3: 1.1.0 Emerald Tree Boa, *Corallus caninus*; 1.1.1 Spiny Tree-climbing Lizard, *Plica plica*; 5.0.0 Giant Leaf Frog, *Phyllomedusa bicolor*; and 2.1.1 Orange-sided Leaf Frog, *Phyllomedusa hypochondrialis*. Tank 4: 2.0.0 Red-eyed Treefrog, *Agalychius callidryas*; 5.0.0 Morelet's Treefrog, *Agalychius moreletii*; 1.0.0 Masked Treefrog, *Hyla lanciformis*; 0.0.2 Clown Treefrog, *Hyla leucophyllata*; 2.1.50 Dusky Treefrog, *Smilisca phaeota*; 3.0.0 Costa Rican Forest Toad, *Bufo haematiticus*; and 1.0.0

Aquatic Anole, *Norops aquaticus*. Tank 5: 4.4.0 Kokoe-pa Poison-dart Frog, *Dendrobates histrionicus*; 2.2.4 Yellow Poison-dart Frog, *Phyllobates bicolor*; 1.2.0 Crested Forest Lizard, *Corytophanes cristatus*; and 1.1.2 Cone-headed Lizard, *Laemanctus longipes*. Tank 6: 4.10.0 Green and Black Poison-dart Frog, *Dendrobates auratus* and 3.5.0 Golfodulcean Poison-dart Frog, *Phyllobates vittatus*. Tank 7: 2.3.0 Amazonian Horned Frog, *Ceratophrys cornuta* and 2.2.0 Dyeing Poison-Dart Frog, *Dendrobates tinctorius*.

The neotropical theme also applied to the plant species selected for the exhibits. Objective considerations were light requirements, planter pocket size and location, moisture levels, and animal species housed in the exhibit. The latter was especially important since plants can play a very important role in the reproduction of many amphibians (Ertelt, 1988).

Subjectively, plants were used to give each exhibit a distinct visual personality. To this end, exceptions to the neotropical theme were sometimes made to achieve a desired aesthetic effect. Vines, branches, leaf letter and "real" rocks are used as additional enhancements.

Graphics

A back-lit color transparency with the same dimension as an exhibit tank window introduces visitors to the area. Topics such as camouflage, adaption and warning coloration are covered and photographs of animal examples are used.

Identification labels, also color transparencies, are located above each exhibit and frontal access is provided to facilitate changing. The animals are portrayed on a black background and since the walls and ceilings are also black, no seams are apparent and the effect is quite pleasing. A short narrative in white letters informs the public of

the species common and scientific name, its size, range, diet, and interesting aspects of its natural history.

"Tank notes" made of clear self-adhesive plastic with black lettering are placed directly on the viewing windows. These are used to point out tadpoles, flowering plants and other items worthy of special attention.

In the center of the hallway, a column is ringed with a transparency of a neotropical jungle stream where some of the species on exhibit were collected. The circular configuration gives a startling three-dimensional quality to the photograph.

A floor to ceiling mural of a neotropical rain forest is seen through the glass revolving exit doors. In this area, the public hears a tape of calls, songs and other sounds made by rain forest animals. No soundtrack is necessary in the exhibit area however, since visitors are usually treated to the real thing.

Conclusions

The new Hidden Life Exhibits have proven to be an overwhelming success from several standpoints. They are extremely popular, aesthetically pleasing and accurate, and relatively simple to maintain. Perhaps most important however, the animals in them continue to thrive. Although the main thrust of our breeding programs occurs in the backup areas (Cover, Wisnieski; in press), six frogs species (*Dendrobates auratus, D. pumilio, Phyllobates lugubris, P. vittatus, Phyllomedusa hypochondrialis, Smilisca phaeota*) and two lizard species (*Corytophanes cristatus, Plica plica*) have reproduced successfully in the Hidden Life exhibits. This represents over 50% of the paired species on display. As a result, visitors are able to include recently hatched reptiles and all stages of amphibian development as part of their viewing experience.

It is out hope that the information presented in this paper will be useful to others planning similar naturalistic exhibits for their collections.

Acknowledgements

We wish to thank the NAIB staff, and former herpetology interns and volunteers for their assistance with this project. We are especially indebted to NAIB Executive Director Nicholas Brown for his support, and to Dr. John Daly, NIH., and Dr. Jack Frenkel, University of Kansas, for providing us with specimens and for sharing much information on dendrobatids. Thanks to Tracy J. Miller and Carole Cover for critically reading and commenting on the original draft of this paper. George Grall, NAIB staff photographer, provided photographs used for the program portion of this paper. Special thanks to Carole Cover for typing assistance.

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Announcements

-Cyprus is starting a new Herpetological Society - The Herpetological Society of Cyprus. They hope to hear from anything interested in reptiles and amphibians from Cyprus. Please contact: Dr. Andreas Jacovides, P.O. Box 2133, Paphos, Cyprus. Tel. 061-38160. Telex 6427 Color CY. Fax 061-33358.

-The Deutsche Gesellschaft für Herpetologie und Terrarienkunde (DGHT) is holding its Annual Meeting September 12 through 16 at the Fürstenberghaus, D4400 Münster. For informtion contact Ingo Pauler, Im Sandgarten 4, D-6706 Wachenheim, West Germany.

-The International Herpetological Symposium, Inc. is having its summer 1991 meeting in Seattle, Washington, hosted by the Pacific Northwest Herpetological Society. Please direct all inquiries to Dr. Richard A. Ross, c/o The Institute for Herpetological Research, P.O. Box 2227, Stanford, CA 94305 Tel. (415) 941-4595 (9AM - 5PM, Pacific Time).

Observations on *Dendrobates auratus*

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I originally started with what was sold to me as *Dendrobates pumilio* - a black bodied frog with red speckling. After conferring with friends, who also bought specimens, we decided that what we had was *D. histrionicus*. Whether this was true or not I will never know; because after a few days they started to die, one by one. They were kept in a 26-gallon terrarium with sandy soil, bromeliads, pothos and a large water dish. The temperate was kept between 82°F and 84°F during the day and lowered to between 75°F and 78°F at night. When I started loosing these frogs I called my supplier and was told that they should be kept cool, around 72°F. Can you imagine - needless to say this didn't help. I eventually lost all of them and was heart broken. I really wasn't sure about trying to keep these frogs again as it is expensive to loose 6 animals, and I feel that if an animals won't live in captivity (at least for me) then I shouldn't try to keep it.

On June 19, 1989 I was told that another species of dart-frog was available - *D. auratus* from wild caught Hawaiian stock. They were suppose to be very hardy and easy to keep - so, I bought two. I placed the frogs in the same 26-gallon set up and fed them aphids and pinhead crickets. They were about one inch long with black bodies and light green stripes. For most of the day they hid but when feeding time arrived they came out and ate everything they could find. I was happy that they both seemed to be settling into their new home. After several

weeks I felt conformable enough with these frogs that I started looking for more. After all, two specimens isn't very good odds for getting a breeding pair. My experience with breeding fish suggested that you should always start with six or more specimens, especially when you can't distinguish male from female. Anyway, the dealer had two left but I was informed that they were extremely skinny and probably not a good purchase. Well, I wanted to see for myself so armed with a bag full of aphids I went down to see them. These were the weakest looking frogs I had ever seen. You could literally see their bone structure beneath their skin. I wasn't excited by what I saw but I fed them and they were able to eat the aphids that were placed near them. I looked each over carefully, the first was the size of the ones I already had with about the same coloration. The second was much larger, almost an inch and a half, with a black body and circlets of bluish-green instead of clean stripes. Neither showed signs of infection and their eyes were bright (for jet black eyes) and attentive, and they were eating. Well I couldn't just leave them there to die! Would you?

They were placed in a separate terrarium, a 29-gallon tank with bromeliads and pothos. I fed them heavily and they responded by gaining weight. Within two weeks they looked and acted the way I expected good healthy frogs should (just a little skinny). I decided to put all four together in the 26-gallon. I wasn't looking for breeding but I did want them to get used to each other.

Each terrarium had one frog that was bold in action, always first to appear when food was present and always followed by its tank mate shortly after but only after it sat on a high perch and looking things over. Once introduced into the 26-gallon tank a separation occurred, not between

pairs but between groups - the original group stayed to the left and the new pair to the right. Very little mixing occurred and the same practice of one coming out first, followed by the other continued. I also noticed that one of the first pair had turned a blue-green color, but I disregarded this thinking I hadn't looked closely enough in the beginning.

Now I don't consider myself impatient but by December, nearly six months later, I couldn't wait to hear some vocalizing or see some signs of courtship - but nothing! I was still keeping the temperature around 75°F during the day and 72°F at night. So I calmed myself by searching for sources of information on these lovely little frogs. I had heard about the ISSD from some friends who had purchased some *D. leucomelas* and *D. tinctorus* from Dale Bertram. I was not able to purchase more *D. auratus* as they wer not available at that time (that was back in October). Then in December after several months of not finding any additional auratus locally I started to regret having not purchased a different species, but just before Christmas my supplier finally had some available. I went down and hand picked eight additional specimens. Each of the new frogs had a black or chocolate brown body and light green stripes. I made sure that I paid special attention to their color - not a blue-green one in the bunch.

Just before going down I set up my newest terrarium - It measured 54"lx22"wx24"h. Water was provided by a 9" diameter water dish with large gravel in the bottom of the dish. I had been reading "Breeding Terrarium Animals" by E. Zimmerman and decided to raise the temperature of the tank to between 80°F and 84°F during the day and 72°F to 75°F during the night. The fluctuation is more due to the room being closed up and getting afternoon sun; its great

for the humidity. I keep the top almost completely covered with Plexiglass so the humidity is very high. It is also sprayed daily, usually twice. I started cultures of three varieties of fruit flies. I also found that our seed bin was producing seed moth maggots along with the aphids and crickets I had a variety of food for the frogs.

On the first of January this year I moved the original four frogs over to the larger terrarium. I figured that by making the colony 12 strong I had to have at least one pair. Everything went smoothly, although I never saw all twelve at once. There was no courting or vocalizing observed. Then on January 9th I made my first discovery - I now had three blue-green frogs. One of the new ones had changed! On the 1st of February I counted five blue-green frogs. They are definitely changing color and interestingly they are all the boldest ones in the terrarium. I'm not sure but I wonder if the original blue-green one is a male and to compete with him the smaller frogs had to change color.

I had provided three breeding caves by using a 4-inch plastic flower pot inverted and notched with an opening over a petri dish. Then on February 14th I found my first clutch of eggs! Eight beautiful black pearls laying in a petri dish. I took the dish of eggs out of the tank and covered it. I decided not to put water in the dish until the following morning. The next day I took pictures of the eggs and of my breeding colony. I put the camera on a tripod, fed the tank, and focused on the area they usually frequented. It wasn't long before I was snapping pictures. I wanted a picture of every frog so I could get a better idea of the color variation. Then the most amazing thing happened - a bright black and yellow frog came into view. Now I've counted twelve frogs in the past and two or three have never been seen outside of a

bromeliad cup, but I never expected to see this type of change in my frogs. After the "shoot' I counted one bright yellow, one dull yellow, one that is a blend of yellow and green, 4 "standard" light green, and five blue-green frogs. Does anyone have an idea on why this color change occurred?

Anyway, back to the eggs - they were all about the same size, glossy black and surrounded by an egg mass approximately twice the size of the egg yoke. On the third day after their discovery distinct development was seen on the top of the eggs. To be honest it looked like a little stick extending just beyond the yolk. By the seventh day they began to look more like tadpoles. Movement was seen for the first time on the eighth day and you could see the developing capillary system extending beyond the body of the tadpole. On the tenth day my friends came to see the eggs and we all sat and discussed dart-poison frogs, made out wish lists and watched the terrariums. I mention this because after all the talking and watching we did I did not expect the frogs to breed, and so I did not inspect the caves (which I usually do every other day). Well that was a mistake! The following day I checked the caves early and surprized a frog inside eating eggs - I was at a loss for words. There was one egg left and four empty jelly masses. It wasn't the frogs fault - I assume it was a female getting ready to breed who discovered the eggs there and was just cleaning up. I decided to check the caves every night from then on. Not a bad decision, because about 9 pm that night I lifted one of the flower pots and surprised a frog which darted away from three new eggs. Now the eggs were watered, but I wondered if there wouldn't have been more if I'd been more patient. So another revision - I decided to check the breeding caves after the light had been out for about an

hour, usually about 11 pm. By the 13th day the first of the eggs hatched into free swimming tadpoles.

I then made a tray with nine compartments, each measuring 3.5" square and about 3" deep. It is made out of a tank divider (by Penn Plex). I use this because it has very small perforations that are smooth and it cuts easily; I use "Weldson 16" pvc glue to assemble the tray. My other reason for using the tank dividers is that the clips and clamps that are provided with the kit I use to suspend it in a 20-gallon aquarium. The aquarium is filled with water and a "Tetra" sponge filter is used for biological filtering.

Today as I finish writing this article my tadpoles are developing well; the largest measuring just over 1.5" total length. I now have 17 free swimming tadpoles and an unbelievable 47 eggs. I had only one egg which was "bad" and it actually looked like it had two yokes. I feed the tadpoles "Formula II" and Elodea and Java moss. A final note - I now believe I have six breeding females which regularly lay eggs every seven days, averaging five eggs per clutch. I don't know how others feel about *D. auratus*, but it has certainly been an enjoyment to me.

Notice

We are looking for someone in the US who would be willing to put together a large order of the new book which was reviewed in the last **ISSD** Newsletter: Pfeilgiftfrösche. Someone who is willing to write and see if we can get a discount on a number of books and who will collect money and send off an order, and then distribute the books in the US when they arrive. If anyone is interested please contact either of the Newsletter editors. Thanks.



Dendrobates histrionicus Berthon Photograph by Ed Oshaben

Dendrobates histrionicus is a member of a group of dendrobatid frogs with similar characters known as the histrionicus group. The best clue to combine these taxa is their chirp calls. Included in this group are *D. arboreus, D. granuliferus, D. histrionicus, D. lehmanni, D. occultator, D. pumilio*, and *D. speciosus*.

This species shows a amazing variety of colors forms and a sampling of this variety can be seen in the wonderful paper by Myers and Daly (1976, Preliminary evaluation of skin toxins and vocalizations in taxonomic and evolutionary studies of poison-dart frogs (Dendrobatidae). Bulletin of the American Museum of Natural History, 157(3): 173-262, 2 pls., 28 figs.). (Continue on page 40)

-New Literature-

Edmonds, Les, 1990, Poison arrow frogs in the terrarium. Tropical Fish Hobbyist, XXXVIII(10): 70-81 (with many excellent photographs).

Ehret, G., Tautz, J., Schmitz, B., and Narins, P. M., 1990, Hearing through the lungs: lung-eardrum transmission of sound in the frog *Eleutherodactylus coqui*. Naturwissenschaften, 77(4): 192-194 (discusses hearing in hylid and dendrobatid frogs).

Address Corrections

This is an address correction from the address listed in **ISSD** Newsletter 2(6).
Wess, Ralf Arno
Mailaender Str. 12/111
D-6000 Frankfurt 70
West Germany

It should also be noted that the 312 area code for all cities and towns outside of Chicago has been changed to 708. It is still 312 for Chicago itself.

Dendrobates histrionicus is known from the Chocoan region of western Colombia and northwestern Ecuador, west to the Pacific coast and east to the Andean foothills, from elevations between 18 m and 1070 m (Silverstone, P.A., 1975, A revision of the Poison-arrow frogs of the genus *Dendrobates* Wagler. Natural History Museum of Los Angeles County, Science Bulletin 21: 1-55).

ISSD invites anyone with an interest in the study of Dendrobatid Frogs to participate in its membership.

Membership Registration:

Name: _____

Address: _____

_____

_____

_____

Phone #: _____

Date: _____

Comments: _____

Annual membership dues are as follows: $20.00 for members living in the U.S.A. and Canada; $25.00 for members living in Europe and South America. For members holding a personal checking account with a U.S. bank - a personal check (made out in U.S. dollars and made payable to **ISSD**) will suffice. For those who do not have an account with a U.S. bank - payment should be made using one of the following methods (listed in order of preference): *1.)* A U.S. Postal Money Order made out in U.S. dollars. *2.)* A Casher's Check from a U.S. bank, or U.S. affiliate of a non-U.S. bank, made out in U.S. dollars. *3.)* A Casher's Check from a non-U.S. bank, made out in the normal currency of the bank of issue, for an amount which will yield $28.00 when it is exchanged. *4.)* Cash -U.S.$, wrapped well so that it cannot be seen through the envelope, and sent via Registered Mail.

Send registration forms and dues to:

ISSD - c/o Ed Tunstall
2320 West Palomino Drive
Chandler, Arizona
85224 U.S.A.